L2: Entry 99 of 126   File: USPT   Jun 25, 2002

US-PAT-NO: 6411961
DOCUMENT-IDENTIFIER: US 6411961 B1

TITLE: Apparatus for providing a reverse star schema data model

DATE-ISSUED: June 25, 2002

INVENTOR-INFORMATION:
NAME	CITY	STATE	ZIP CODE	COUNTRY
Chen; Li-Wen	Cupertino	CA		

ASSIGNEE-INFORMATION:
NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
MetaEdge Corporation	Sunnyvale	CA			02

APPL-NO: 09/ 306650   [PALM]
DATE FILED: May 6, 1999

PARENT-CASE:
CROSS-REFERENCES TO RELATED APPLICATIONS This application claims priority from the
following U.S. Provisional Patent Application, the disclosure of which, including
all appendices and all attached documents, is incorporated by reference in its
entirety for all purposes: U.S. Provisional Patent Application Ser. No. 60/116,086,
Li-Wen Chen entitled, "METHOD AND APPARATUS FOR PERFORMING CUSTOMER DATA ANALYSIS
OF A COMPUTER DATABASE USING REVERSE STAR SCHEMA DATA MODEL," filed Jan. 15, 1999.
The following commonly-owned co-pending applications, including this one, are being
filed concurrently and the others are hereby incorporated by reference in their
entirety for all purposes: 1. U.S. patent application Ser. No. 09/306,677, Li-Wen
Chen and Juan Oritz entitled, "METHOD FOR PROVIDING A REVERSE STAR SCHEMA DATA
MODEL"; 2. U.S. patent application Ser. No. 09/306,650, Li-Wen Chen entitled,
"APPARATUS FOR PROVIDING A REVERSE STAR SCHEMA DATA MODEL"; and 3. U.S. patent
application Ser. No. 09/306,693, Li-Wen Chen entitled, "SYSTEM FOR PROVIDING A
REVERSE STAR SCHEMA DATA MODEL".

INT-CL: [07] G06 F 17/60

US-CL-ISSUED: 707/102; 707/104.1, 705/10
US-CL-CURRENT: 707/102; 705/10, 707/104.1

FIELD-OF-SEARCH: 705/10, 707/3, 707/5, 707/10, 707/103, 707/201, 707/100-104, 717/1

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

[Search Selected] [Search ALL] [Clear]

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☐	4972504	November 1990	Daniel, Jr. et al.	
☐	5036314	July 1991	Barillari et al.	
☐	5168445	December 1992	Kawashima et al.	
☐	5191522	March 1993	Bosco et al.	364/401
☐	5299115	March 1994	Fields et al.	
☐	5615109	March 1997	Eder	
☐	5644723	July 1997	Deaton et al.	
☐	5715450	February 1998	Ambrose et al.	
☐	5721903	February 1998	Anand et al.	395/605
☐	5758355	May 1998	Buchanan	
☐	5787437	July 1998	Potterveld et al.	707/103
☐	5794246	August 1998	Sankaran et al.	
☐	5854746	December 1998	Yamamoto et al.	
☐	5873096	February 1999	Lim et al.	
☐	5893075	April 1999	Plainfield et al.	
☐	6151601	November 2000	Papierniak et al.	707/10
☐	6167405	December 2000	Rosensteel, Jr. et al.	707/102
☐	6212524	April 2001	Weissman et al.	707/101

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FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
WO-200057311	February 2001	WO	

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Gopalkrishnan et al. Star/Snow-flake Schema Driven Object-Relationship Data Warehouse Design and Query Processing Strategy. star schema conversion to object-relational warehouse.*
Brooks. Mark of the data marts. DBMS, Mar. 1997, v10, n3, pp 55(4).*
Krippendorf et al. The translation of star schema into entity relationship diagrams. Database and Expert Systems Applications, Sep. 1997, pp. 390-395.*
Greene. Oracle8 Server Unleashed. Sams, 1998, chapter 30 "Data Warehouses".*
Brachman et al. Mining Business Databases. Communications of the ACM, Nov. 1996, pp. 42-48.*
Firestone. Object-oriented Data Warehousing. Executive Information Systems, Inc. White Paper No. 5, Aug. 7, 1997, downloaded Jul. 25, 2001 http://dkms.com.

ART-UNIT: 2163

PRIMARY-EXAMINER: Hafiz; Tariq R.

ASSISTANT-EXAMINER: Robertson; D.

ATTY-AGENT-FIRM: Squire, Sanders & Dempsey LLP

ABSTRACT:

According to the invention, techniques for organizing information from systems in a data warehousing environment are provided. In a particular embodiment, the invention provides an apparatus for analyzing data in at least data source of an enterprise. The apparatus can include a meta model for an enterprise. The enterprise is typically a business activity, but can also be other loci of human activity. A data schema derived from the meta model can also be part of the apparatus. The apparatus can also include a database organized according to the data schema. The apparatus can translate data from a variety of sources to the data schema. The apparatus can incorporate data into the database and perform a variety of analyses on the data in the database.

10 Claims, 16 Drawing figures

L2: Entry 99 of 126   File: USPT   Jun 25, 2002

US-PAT-NO: 6411961
DOCUMENT-IDENTIFIER: US 6411961 B1

TITLE: Apparatus for providing a reverse star schema data model

DATE-ISSUED: June 25, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Chen; Li-Wen	Cupertino	CA		

US-CL-CURRENT: 707/102; 705/10, 707/104.1

CLAIMS:

What is claimed is:

1. A computer-based apparatus for data warehousing, comprising:

a memory; and

a processor, coupled to said memory, said processor operatively disposed to:

select a template from a plurality of pre-defined ones, said templates embodying a plurality of characteristics of the business;

select at least one of a plurality of customer entities from a plurality of pre-defined ones to form a focal group of customer entities, said selecting based upon said template;

define at least one of a plurality of customer transaction entities and at least one of a plurality of attributes of said customer transaction entities to form a customized group of customer activity components;

define at least one of a plurality of customer event types in said customer activity components, wherein said customer event types comprise attributes of said customer transaction entities in said customer activity components;

select at least one of a plurality of data tables and at least one of a plurality of attributes of said data tables to form a data schema, wherein said data schema is a reverse Star data schema;

determine at least one of a plurality of attributes based on data types of tables of said data source;

determine for said attributes at least one of a plurality of primary keys;

create a <u>data warehouse</u> database from said data schema; and

create at least one of a plurality of data mapping rules, said mapping rules providing translation information for tables and attributes of said data sources to said <u>data warehouse</u>.

2. The apparatus of claim 1 wherein said processor is further disposed to define for said attributes at least one of a plurality of foreign keys.

3. The apparatus of claim 1 wherein said processor is further disposed to define application-specific entities for said customer activity components.

4. The apparatus of claim 3 wherein said processor is further disposed to define at least one of a plurality of attributes for said application-specific entities.

5. The apparatus of claim 1 wherein said data types are determined without user intervention.

6. The apparatus of claim 5 wherein said processor is further disposed to provide to users the capability to make changes to said data types if said users choose not to use the derived ones.

7. The apparatus of claim 1 wherein said processor is further disposed to perform customer purchasing behavior analysis.

8. The apparatus of claim 1 wherein said processor is further disposed to perform customer market segmentation analysis.

9. The apparatus of claim 1 wherein said processor is further disposed to perform customer valuation analysis.

10. The apparatus of claim 1 wherein said processor is further disposed to perform customer churn analysis.

L2: Entry 105 of 126   File: USPT   Mar 26, 2002

US-PAT-NO: 6363353
DOCUMENT-IDENTIFIER: US 6363353 B1

TITLE: System for providing a reverse star schema data model

DATE-ISSUED: March 26, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Chen; Li-Wen	Cupertino	CA		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
MetaEdge Corporation	Sunnyvale	CA			02

APPL-NO: 09/ 306693   [PALM]
DATE FILED: May 6, 1999

PARENT-CASE:
CROSS-REFERENCES TO RELATED APPLICATIONS This application claims priority from the
following U.S. Provisional Patent Application, the disclosure of which, including
all appendices and all attached documents, is incorporated by reference in its
entirety for all purposes: U.S. Provisional Patent Application Ser. No. 60/116,086,
Li-Wen Chen entitled, "METHOD AND APPARATUS FOR PERFORMING CUSTOMER DATA ANALYSIS
OF A COMPUTER DATABASE USING REVERSE STAR SCHEMA DATA MODEL," filed Jan. 15, 1999.
The following commonly-owned co-pending applications, including this one, are being
filed concurrently and the others are hereby incorporated by reference in their
entirety for all purposes: 1. U.S. patent application Ser. No. 09/306,677, Li-Wen
Chen and Juan Oritz entitled, "METHOD FOR PROVIDING A REVERSE STAR SCHEMA DATA
MODEL," 2. U.S. patent application Ser. No. 09/306,650, Li-Wen Chen entitled,
"APPARATUS FOR PROVIDING A REVERSE STAR SCHEMA DATA MODEL,"; and 3. U.S. patent
application Ser. No. 09/306,693, Li-Wen Chen entitled, "SYSTEM FOR PROVIDING A
REVERSE STAR SCHEMA DATA MODEL."

INT-CL: [07] G06 F 17/60

US-CL-ISSUED: 705/10; 707/102, 707/104.1
US-CL-CURRENT: 705/10; 707/102, 707/104.1

FIELD-OF-SEARCH: 705/10, 707/3, 707/5, 707/60, 707/201, 707/100-104, 712/1

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

[Search Selected   ] [Search ALL   ] [Clear]

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	6151601	November 2000	Papierniak et al.	707/10
☐	6167405	December 2000	Rosensteel, Jr. et al.	707/102
☐	6212524	April 2001	Weissman et al.	707/101

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
WO-200057311	February 2001	WO	

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Brooks. Mark of the data marts. DBMS, Mar. 1997, v10, n3, pp 55(4).*
Krippendorf et al. The translation of star schema into entity relationship diagrams. Database and Expert Systems Applications, Sep. 1997, pp. 390-395.*
Greene. Oracle8 Server Unleashed. Sams, 1998, chapter 30 "Data Warehouses".*
Brachman et al. Mining Business Databases. Communications of the ACM, Nov. 1996, pp. 42-48.*
Firestone. Object-oriented Data Warehousing. Executive Information Systems, Inc. White Paper No. 5, Aug. 7, 1997, downloaded Jul. 25, 2001 http://dkms.com.

ART-UNIT: 2163

PRIMARY-EXAMINER: Hafiz; Tariq R.

ASSISTANT-EXAMINER: Robertson; D

ATTY-AGENT-FIRM: Squire, Sanders & Dempsey LLP

ABSTRACT:

According to the invention, techniques for organizing information from systems in a data warehousing environment are provided. In a particular embodiment, the invention provides a system for analyzing data in at least data source of an enterprise. The system includes a variety of steps, such as a step of providing a meta model for an enterprise. The enterprise is typically a business activity, but can also be other loci of human activity. A step of forming a data schema from the meta model is also part of the system. The system also includes creating a database organized to the data schema. Translating data from a variety of sources to the data schema is also part of the system. A step of incorporating data into the database is part of the system. The system can also include a step of performing analysis on the data in the database. The combination of these steps can organize information in a data warehousing environment.

6 Claims, 16 Drawing figures

L2: Entry 105 of 126   File: USPT   Mar 26, 2002

US-PAT-NO: 6363353
DOCUMENT-IDENTIFIER: US 6363353 B1

TITLE: System for providing a reverse star schema data model

DATE-ISSUED: March 26, 2002

INVENTOR-INFORMATION:
NAME	CITY	STATE	ZIP CODE	COUNTRY
Chen; Li-Wen	Cupertino	CA		

US-CL-CURRENT: 705/10; 707/102, 707/104.1

CLAIMS:

What is claimed is:

1. A computer based computer program product for data warehousing, comprising:
code for selecting a template from a plurality of pre-defined ones, said
templates embodying a plurality of characteristics of a business; code for
selecting at least one of a plurality of customer entities from a plurality of
pre-defined ones to form of focal group of customer entities, said selecting
based upon said template;, code for defining at least one of a plurality of
customer transaction entities and at least one of a plurality of attributes of
said customer transaction entities to form a customized group of customer
activity components; code for defining at least one of a plurality of customer
event types in said customer activity components, wherein said customer event
types comprise attributes of said customer transaction entities in said
customer activity components; code for selecting at least one of a plurality
of data tables and at least one of a plurality of attributes of said data
tables to form a data schema, wherein said data schema is a reverse Star data
schema; code for determining at least one of a plurality of attributes based
on data types of tables of said data source; code for determining for said
attributes at least one of a plurality of primary keys; code for creating a
data warehouse database from said data schema; and code for creating at least
one of a plurality of data mapping rules, said mapping rules providing
translation information for tables and attributes of said data sources to said
data warehouse.

2. The computer program product of claim 1 further comprising code for
defining for said data types at least one of a plurality of foreign keys.

3. The computer program product of claim 1 further comprising: code for
defining application-specific entities for said customer activity components.

4. The computer program product of claim 3 further comprising: code for
defining at least one of a plurality of attributes for said application-
specific entities.

5. The computer program product of claim 1 wherein said code for determining said data types is performed automatically.

6. The computer program product of claim 5 further comprising: code for providing to users the capability to make changes to said data types if they choose not to use the automatically derived ones.

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L2: Entry 103 of 126   File: USPT   Apr 23, 2002

PATENT-NO: 6377934
DOCUMENT-IDENTIFIER: US 6377934 B1

TITLE: Method for providing a reverse star schema data model

DATE-ISSUED: April 23, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Chen; Li-Wen	Cupertino	CA		
Ortiz; Juan J.	Hayward	CA		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
MetaEdge Corporation	Sunnyvale	CA			02

APPL-NO: 09/ 306677   [PALM]
DATE FILED: May 6, 1999

PARENT-CASE:
CROSS-REFERENCES TO RELATED APPLICATIONS This application claims priority from the
following U.S. Provisional Patent Application, the disclosure of which, including
all appendices and all attached documents, is incorporated by reference in its
entirety for all purposes: U.S. Provisional patent application Ser. No. 60/116,086
Li-Wen Chen entitled, "METHOD AND APPARATUS FOR PERFORMING CUSTOMER DATA ANALYSIS
OF A COMPUTER DATABASE USING REVERSE STAR SCHEMA DATA MODEL," filed Jan. 15, 1999.

INT-CL: [07] G06 F 16/102

US-CL-ISSUED: 705/10; 707/102, 707/104.1
US-CL-CURRENT: 705/10; 707/102, 707/104.1

FIELD-OF-SEARCH: 705/10, 707/10, 707/3, 707/5, 707/201, 707/102, 707/101, 717/1

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected   Search ALL   Clear

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	4972504	November 1990	Daniel, Jr. et al.	
☐	5036314	July 1991	Barillari et al.	
	5168445	December 1992	Kawashima et al.	

☐

☐	<u>5191522</u>	March 1993	Bosco et al.	364/401
☐	<u>5299115</u>	March 1994	Fields et al.	
☐	<u>5615109</u>	March 1997	Eder	
☐	<u>5644723</u>	July 1997	Deaton et al.	
☐	<u>5715450</u>	February 1998	Ambrose et al.	
☐	<u>5721903</u>	February 1998	Anand et al.	395/605
☐	<u>5758355</u>	May 1998	Buchanan	
☐	<u>5787437</u>	July 1998	Potterveld et al.	707/103
☐	<u>5794246</u>	August 1998	Sankaran et al.	
☐	<u>5854746</u>	December 1998	Yamamoto et al.	
☐	<u>5873096</u>	February 1999	Lim et al.	
☐	<u>5893075</u>	April 1999	Plainfield et al.	
☐	<u>6151601</u>	November 2000	Papierniak et al.	707/10
☐	<u>6167405</u>	December 2000	Rosensteel, Jr. et al.	707/102
☐	<u>6212524</u>	April 2001	Weissman et al.	707/101

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
WO-200057311	February 2001	WO	

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Gopalkrishnan et al. Star/Snow-flake Schema Driven Object-Relationship <u>Data Warehouse</u> Design and Query Processing Strategy. <u>star schema</u> conversion to object-relational warehouse.*
Brooks. Mark of the data marts. DBMS, Mar. 1997, v10, n3, pp. 55(4).*
Krippendorf et al. The translation of <u>star schema</u> into entity relationship diagrams. Database and Expert Systems Applications, Sep. 1997, pp. 390-395.*
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Brachman et al. Mining Business Databases. Communications of the ACM, Nov. 1996, pp. 42-48.*
FIRESTONE. Object-oriented Data Warehousing. Executive Information Systems, Inc. White Paper No. 5, Aug. 7, 1997, downloaded Jul. 25, 2001 http://dkms.com.

ART-UNIT: 2163

PRIMARY-EXAMINER: Hafiz; Tario R.

ASSISTANT-EXAMINER: Robertson; Dave

ATTY-AGENT-FIRM: Squire, Sanders & Dempsey LLP

ABSTRACT:

According to the invention, techniques for organizing information from systems in a

data warehousing environment are provided. In an exemplary embodiment, the
invention provides a method for analyzing data from one or more data sources of an
enterprise. The method provides a meta-model based technique for modeling the
enterprise data. The enterprise is typically a business activity, but can also be
other loci of human activity. Embodiments according to the invention can translate
data from a variety of sources to particular database schema in order to provide
organization to a data warehousing environment.

6 Claims, 16 Drawing figures

L2: Entry 103 of 126   File: USPT   Apr 23, 2002

US-PAT-NO: 6377934
DOCUMENT-IDENTIFIER: US 6377934 B1

TITLE: Method for providing a reverse star schema data model

DATE-ISSUED: April 23, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Chen; Li-Wen	Cupertino	CA		
Ortiz; Juan J.	Hayward	CA		

US-CL-CURRENT: 705/10; 707/102, 707/104.1

CLAIMS:

What is claimed is:

1. A computer based method for data warehousing, comprising:

selecting a template from a plurality of pre-defined ones, said templates embodying a plurality of characteristics of a business;

selecting at least one of a plurality of customer entities from a plurality of pre-defined ones to form of focal group of customer entities, said selecting based upon said template;

defining at least one of a plurality of customer transaction entities and at least one of a plurality of attributes of said customer transaction entities to form a customized group of customer activity components;

defining at least one of a plurality of customer event types in said customer activity components, wherein said customer event types comprise attributes of said customer transaction entities in said customer activity components;

selecting at least one of a plurality of data tables and at least one of a plurality of attributes of said data tables to form a data schema, wherein said data schema is a reverse star data schema;

determining at least one of a plurality of attributes based on data types of tables of said data source;

determining for said attributes at least one of a plurality of primary keys;

creating a data warehouse database from said data schema; and

creating at least one of a plurality of data mapping rules, said mapping rules providing translation information for tables and attributes of said data sources to said <u>data warehouse</u>.

2. The method of claim 1 further comprising defining for said attributes at least one of a plurality of foreign keys.

3. The method of claim 1 further comprising:

defining application-specific entities for said customer activity components.

4. The method of claim 3 further comprising:

defining at least one of a plurality of attributes for said application-specific entities.

5. The method of claim 1 wherein said deriving said data types is performed automatically.

6. The method of claim 5 further comprising:

providing to users the capability to make changes to said data types if they choose not to use the automatically derived ones.

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